WILEY

Review: A Large Scale Ecological Experiment of the War

Author(s): A. G. T.

Review by: A. G. T.

Source: *Journal of Ecology*, Vol. 10, No. 2 (Nov., 1922), pp. 237-239

Published by: British Ecological Society

Stable URL: <http://www.jstor.org/stable/2255744>

Accessed: 18-06-2016 15:41 UTC

Your use of the JSTOR archive indicates your acceptance of the Terms & Conditions of Use, available at

<http://about.jstor.org/terms>

JSTOR is a not-for-profit service that helps scholars, researchers, and students discover, use, and build upon a wide range of content in a trusted digital archive. We use information technology and tools to increase productivity and facilitate new forms of scholarship. For more information about JSTOR, please contact support@jstor.org.

Wiley, British Ecological Society are collaborating with JSTOR to digitize, preserve and extend access to *Journal of Ecology*

NOTICES OF PUBLICATIONS OF GENERAL BEARING

A LARGE SCALE ECOLOGICAL EXPERIMENT OF THE WAR

Massart, Jean. *La biologie des inondations de l'Yser et la flore des ruines de Nieuport.* Bruxelles, 1922. Pp. 22 with 22 photographs.

The action of the Belgian army, during the autumn of 1914, in flooding the lower part of the Yser valley (which is an almost perfectly flat alluvial plain lying behind the coastal dunes below high tide-mark) to stop the advance westward of the Germans, is known probably to the whole civilized world. Massart here gives a short but very interesting account of exactly what happened and of its effects upon the vegetation.

On the 29th of October the Belgians had been forced back to the railway embankment running from Dixmude to Nieuport, and the Germans had succeeded in occupying the village of Ramscappelle on this line, though they were repulsed the next day. In these critical circumstances the Belgians opened at Nieuport, near the mouth of the Yser, at high tide, the sluices of the Noordvaart, a canal ordinarily serving to let off the land water at low tide. The sea entered the canal, penetrated into the drainage ditches separating the fields and from there covered the surface of the land. The next day (the 30th) the inundation reached Ramscappelle, and, by the 2nd of November, Dixmude. To the east the inundation was limited by the embankment of the Yser, on the west by the railway embankment previously mentioned. Nieuport itself, built on the dunes, was above the level of the waters. The Belgian engineers, having control of the sluices, limited the height of the incoming water to 3.45 meters, giving a depth of 10 to 30 cm. only on the greater part of the flooded land. The slight local elevations of the almost perfectly horizontal surface remained a few decimeters above the water level. Besides the flooding of the Nieuport-Dixmude plain through the sluices of the Noordvaart, other sluices were opened with the object of flooding other areas through their drainage canals; through the Nieuwendamme creek the space between the Yser and the Plasschendaële canal; through the Yperlée drainage canal the land between the Plasschendaële canal and the road from Nieuport to Lombartzyde; and the polders to the west of this road through the 't Geleide sluice. When the Germans occupied Dixmude on the 10th of November the country above it, on the right bank of the Yser, was flooded through the Yser sluice at Nieuport.

During the whole of the war the Belgian engineers maintained control of the sluices at Nieuport, and were thus able to regulate the height of the water. This was necessary because the islets which stood above the flood were occupied by advanced posts with which communication was maintained by wooden bridges; so that if the water rose these would be flooded, while if it fell the enemy would have crossed. In winter the rains and the waters of the streams were more than enough to compensate evaporation, but in summer it had to be compensated by letting in the tidal water. The German official notices posted at Brussels on the 2nd and the 21st of November, falsely stated that the sluices at Nieuport had been destroyed, and that the water exceeded in places the height of a man.

The salt water destroyed, over the inundated areas, the entire fauna and flora, both aquatic and terrestrial. Thus, every tree (poplars, willows, elms, and hawthorns) whose roots were touched by the salt water died; and the same was true of herbaceous plants. In this most fertile portion of Belgium, where not a scrap of ground had remained uncultivated, no life remained after the retreat of the floods. Below Dixmude everything was killed without exception. Above Dixmude, however, the flood was fed largely by the Yser and its tributaries, and the more dilute salt solution did not suffice to kill all the plants. At Blankert, for instance, where the pre-war flora was well known, it was found in 1919 and 1920

that while the poplars, the elders, *Typha angustifolia* and *Scirpus lacustris* were all killed, *Salix alba* and *Nymphaea alba* were only partly destroyed, and *Salix cinerea*, *Sium latifolium*, *Hydrocharis morsus-ranae* and *Phragmites communis* resisted the effect of the salt. The two species of *Salix* produced girdles of roots on their trunks at the new water level, about 1 meter above the old, and the stem increased in thickness above this girdle. The poplar and elder were quite unable to do anything of the kind and were killed.

The slight salinity of the water above Dixmude did not, apparently, lead to the immigration of new organisms. But nearer the sea there was a great immigration of marine species. Near Nieuport the water remained salt during the whole of the war, and here every hard body (trunks of trees, wooden fences, brick walls, bridges, barbed wire, etc., etc.) was colonized abundantly by barnacles (*Balanus improvisus*), the bryozoon *Membranipora membranacea*, the molluscs *Hydrobia ulvae*, *H. ventrosa* and *Mytilus edulis*, together with *Cladophora* sp. Other animals, such as Nereids and other worms, lived in the mud on the bottom. Among the swimming and floating organisms the only ones left after the retreat of the salt waters were those in the ditches and shell-holes which could accommodate themselves to the decreasing salinity. Thus, *Palaemonetes varians* lived in shell-holes where the water had a density of 1.007–1.005, together with freshwater beetles and Hemiptera. *Porphyra laciniata*, sterile, and with no red pigment, formed green floating plates in a shell-hole with a water density of 1.001, accompanied by the rhizopod *Arcella vulgaris*. The accommodation of *Porphyra* to hypotonic solutions is in line with its habitat in the intertidal zone where it is wetted by rainwater. The constant immersion in the hypotonic solution had the same effect of causing the disappearance of the red pigment as in *Lemanea* and *Batrachospermum*.

In 1919, the first season after the draining off of the salt water, only a scattered flora appeared on the naked soil, composed of *Aster tripolium*, *Atriplex littoralis*, *A. hastata*, *A. patula*, and, to a less degree, of *Salicornia herbacea*, *Suaeda maritima*, *Spergularia media*, *S. salina*. The seeds of these plants no doubt came, with the tide, from the "schorres" on the banks of the tidal Yser below Nieuport. But *Plantago maritima*, *Atropis maritima*, *Triglochin maritimum*, *Glaux maritima* and *Statice limonium*, equally abundant there, did not, for some unknown reason, appear. During 1920 the vegetation was completely changed. The rains of eighteen months had washed the salt from all the higher ground and salt water remained only in shell-holes and ditches. The flora which had taken refuge during the salt water inundation on the parapets of the "trenches"¹ of the advanced posts was, at last, able to descend and compete with the halophilous vegetation below. The table of 85 species of flowering plants given by the author shows that numerous species, mostly wayside weeds, etc., invaded the flats from the parapets, while the more pronounced halophytes were confined or almost confined to the walls of the shell-holes. A typical shell-hole had a bare zone exposed by the evaporation of the summer just above the water, then a zone of *Atriplex hastata*, followed by one of *Aster tripolium*, with the weeds, etc., especially *Agropyrum repens*, beyond. The last named was actively suppressing the *Aster*, which had flourished luxuriantly in 1919. The common Asters of the schorres are mostly without the mauve ray. Those which appeared after the inundation of Lombartzyde round the shell-holes, showed the radiate and the non-radiate forms in about equal numbers. At Ramsceppelle the radiate forms were clearly in a majority. Round Schoorbakke and Pervyse all the plants showed radiate flowers. Thus, it is clear that the less salt there is in the soil the more the radiate form predominates. This may be due to a direct effect of the salt, or it may be that the difference is hereditary and the lessened salinity gives the radiate form the advantage. Experiments have been undertaken to decide the point.

The gradual decrease in concentration of salt in the ditches and shell-holes enabled the author to work out the maximum and minimum proportions of salt that various water plants could tolerate. *Ranunculus baudotii* and *R. aquatilis* tolerated up to 1.0005, *Potamogeton pectinatus* up to 1.0055, *Zannichellia palustris* up to 1.007, *Phragmites communis* up to 1.016, *Scirpus maritimus* up to 1.025 (sea water). *Ruppia maritima* ranges from 1.016 to 1.007, not tolerating freshwater.

¹ These "trenches" were really built up with sandbags on the level ground of the islets.

The flora of the slight elevations, not submerged by the flood, but remaining as islets, consisted before the war of (1) cultivated plants, (2) weeds, (3) wayside species, (4) ditch and canal species. Of these (1) and (2) disappeared when the surrounding area was flooded and cultivation abandoned. (3) and (4) entered upon a competition which resulted in the incontestable victory of *Phragmites* (corresponding with the high level of the ground water). After the armistice each boss was covered with a reed thicket so dense that there was hardly room for other species. On the retreat of the waters and the corresponding fall of the ground water, *Phragmites* could no longer live on the eminences, but it sent out rhizomes which grew out in all directions on the surface of the surrounding flats to distances of 10 to 12 meters and some of the plants regained in this way lower levels and ditches where they could establish themselves, thus returning to their pre-war habitat.

Of the two bulrushes, *Typha latifolia* occupied before the war the stagnant waters of the interior of the country, while *Typha angustifolia* reigned supreme near the coast. But it is the former species which has invaded the fresh water of the innumerable holes and trenches made during the war in the coastal region, has colonised, in company with *Phragmites*, the freshwater inundations, and, around Blankaert, has ousted *Typha angustifolia* from much of its former pre-eminence. It remains to be seen if, with the return of completely normal conditions, there will be a return to the pre-war distribution of the two species.

In the coastal region, *Brassica nigra* only existed before the war as a widespread weed of the dune cultivation. At the armistice all the parapets in the triangle Pervyse-Schoorbakke-Dixmude disappeared under an ocean of this plant, which was in full flower in the summer of 1919. Since then it has decreased each year, even on the parapets which have not yet been levelled.

In the ruins of Nieuport, which was completely destroyed by bombardment, the author counted 70 species of flowering plants in the summer of 1920, neglecting the remains of garden vegetables and common garden weeds. Of these 70, 41 came from the gardens of the town itself or the immediate neighbourhood, as many as 23 from remoter regions of Belgium, and six from southern Europe, probably brought with the forage of the French army. Of the Belgian species not hitherto found in the neighbourhood of Nieuport, *Epilobium spicatum*, *Verbascum thapsus*, *Chrysanthemum vulgare* and *Artemisia vulgaris* were common in the ruins; the others, e.g. such wet soil plants as *Ulmia palustris* and *Symphytum officinale*, less so, but how and why they came is a mystery.

A. G. T.

ROOT SYSTEMS OF CROP PLANTS

Weaver, John E., Jean, Frank C., and Crist, John W. "Development and Activities of Roots of Crop Plants." Carnegie Institution of Washington Publication 316. May, 1922. Pp. vi and 117. 14 Plates and 42 Text-figures.

This is an extension of the senior author's previous investigations of the distribution of root systems, recorded especially in *The ecological relations of roots*, 1919 (of which an account was given in this JOURNAL, 8, pp. 150-154) and in *Root development in the grassland formation* (Carn. Inst. Pub. 292, 1920). It is pointed out in the Introduction that a thorough and accurate knowledge of root production by different crop plants in different types of soil and under different conditions of soil moisture, aeration, etc., forms the only direct scientific basis for the proper selection of the most suitable crops. While, of course, root development is largely reflected in that of the shoot, it is, after all, the roots themselves that directly depend upon the soil. Evidence has accumulated that the results of experiments with plants grown in containers, even very large containers, are liable to be vitiated by the check to root development involved, the roots of plants in the open soil often penetrating to astonishing depths; and similarly experiments with plants grown in close lateral contact are sometimes seriously affected by the factor of root competition.

The method of investigating the root systems of field crops was the same as that used in the previous work on native vegetation, namely, digging deep trenches beside the plants: the sides of these are then carefully excavated with a hand pick and the root systems care-